Atty. Dkt. No.: 039153-0441 (GO406)

## WHAT IS CLAIMED IS:

1. An integrated circuit fabrication process, the process comprising the steps of:

patterning a transistor gate pattern on a photoresist layer;
curing the transistor gate pattern with an electron beam;
trimming the cured transistor gate pattern; and
transferring the trimmed transistor gate pattern to a layer
disposed below the photoresist layer to form a transistor gate, wherein the
transistor gate includes a width and a length, and a variation of the width
along the length of the transistor gate is reduced due to the curing step.

- 2. The process of claim 1, wherein the photoresist layer is comprised of a photoresist material typicaly used for at least one of 248 nm lithography, 193 nm lithography, and extreme ultraviolet light (EUV) lithography.
- 3. The process of claim 2, wherein the photoresist layer is comprised of a photoresist material of a type typically used for 193 nm and 248 nm lithography and is commercially available.
- 4. The process of claim 1, wherein the final gate transistor width is in the range of approximately 20-60 nm.
- 5. The process of claim 1, wherein the curing step includes exposing the transistor gate pattern to the electron beam having a dose in the range of approximately 100-100000  $\mu$ C/cm<sup>2</sup>.
- 6. The process of claim 1, wherein the curing step includes exposing the transistor gate pattern to the electron beam having an accelerating voltage in the range of approximately 0.5-20 Kv.

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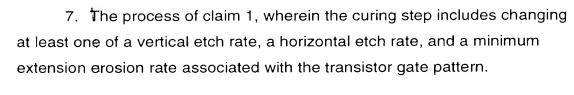
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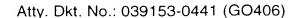
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- 8. A method of forming a transistor having a gate width of less than 70 nm, the method comprising the steps of:
- E-beam radiating a gate pattern of a photoresist layer; trimming the E-beam eradiated gate pattern of the photoresist layer; and
  - etching a polysilicon layer disposed below the photoresist layer in accordance with the trimmed gate pattern to form a gate of the transistor, the gate width being less than 70 nm.
  - 9. The method of claim 8, wherein the E-beam radiating step uses an electron beam at a dose in the range of approximately 100-100000  $\mu$ C/cm<sup>2</sup>.
- 1 10. The method of claim 9, wherein the electron beam is provided at 2 an accelerating voltage in the range of approximately 0.5-50 Kv.
  - 11. The method of claim 9, wherein a uniformity of the gate width is 4 to 6 nm over 3 nm segment.
  - 12. The method of claim 9, wherein the photoresist layer is comprised of a material selected from a group including acrylate-based polymer, alicyclic-based polymer, and phenolic-based or polystyrene-based polymer.
  - 13. The method of claim 9, wherein the E-beam radiation step includes affecting at least one of a vertical etch rate, a horizontal etch rate, and a minimum extension erosion rate associated with the gate pattern of the photoresist layer.
  - 14. The method of claim 9, wherein the E-beam radiation step achieves an enhancement interim rate for a commercially available resists



- using lithography processes with either 248 nm and 193 nm wavelength of light.
  - 15. An integrated circuit, comprising: an isolation region;
- a transistor surrounded by the isolation region, wherein the transistor includes a gate, a critical dimension of the gate being less than approximately 60 nm, and the gate being defined by an E-beam eradiated gate feature on a photoresist layer.
- 16. The integrated circuit of claim 15, wherein the E-beam eradiated gate feature on the photoresist layer is formed by an electron beam exposure.
- 17. The integrated circuit of claim 15, wherein a uniformity of the critical dimension along a length of the gate is 4 to 6 nm over a 3 nm segment.
- 18. The integrated circuit of claim 15, wherein the photoresist layer is comprised of a material selected from acrylate-based polymer, alicyclic-based polymer, and polystyrene and phenolic-based polymer.
- 19. The integrated circuit of claim 18 wherein the critical dimension is between 20 and 60 nm.
- 20. The integrated circuit of claim 18 wherein uniformity of the critical dimension along a length of the gate is 4 to 6 more a 3 nm segment.